Developing an Expert System to Warts and Verruca

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Abstract: *Warts and verrucas are common skin conditions caused by the human papillomavirus (HPV) infection. They present as raised, rough, or bumpy growths on the hands, feet, or other areas subjected to friction or pressure. Plantar warts exhibit a rough surface with small black dots, while genital warts have a cauliflower-like appearance. Pain or itchiness may accompany these lesions. Factors such as close contact with infected individuals and immune compromise can impact the severity and spread of warts. Diagnosis is primarily based on clinical examination, and referral to a dermatologist may be necessary for uncertain cases. Treatment options range from over-the-counter remedies to professional interventions. Persistent or symptomatic lesions should be evaluated by a healthcare professional. Improved understanding and effective management of warts and verrucas are essential for optimal patient outcomes.*
Keywords: *Artificial intelligent, expert system, Warts and verrucase, CLIPS.*

1. INTRODUCTION

Warts and verrucas, known medically as cutaneous warts, are common dermatological conditions caused by the human papillomavirus (HPV) infection. These viral infections manifest as raised, rough, or bumpy growths on the skin and primarily affect the hands, feet, and facial areas. Warts and verrucas can occur in individuals of all ages, with a higher prevalence among children and adolescents. The clinical appearance of warts and verrucas can vary, with plantar warts displaying a rough surface and small black dots, while genital warts often have a cauliflower-like appearance. These growths can cause aesthetic concerns and, in some cases, physical discomfort, such as pain or itching. Transmission of HPV occurs through direct skin-to-skin contact or indirectly through contaminated surfaces. Certain risk factors, including close contact with infected individuals, compromised immune function, or frequent exposure to HPV, can increase the likelihood of developing warts and verrucas.

2. EXPERT SYSTEM

An expert system has been established to diagnose warts and verrucas. disease, aiming to assist doctors and streamline the disease discovery process. This expert system operates by presenting a comprehensive list of symptoms associated with warts and verrucas and enabling users to easily select the relevant symptoms. The system was developed using the Clips language and incorporates a user-friendly interface to enhance usability.

The initial interface offers four tasks for the user to choose from. Upon selecting the "Start" icon, the user is presented with an interface displaying a list of symptoms. The user can then proceed to select all the symptoms that are related to the disease they are interested in diagnosing.

Overall, this expert system serves as a valuable tool in facilitating the diagnosis of diseases related to warts and verrucas. It simplifies the process by providing a menu-based system that guides users in selecting relevant symptoms, ultimately aiding in accurate and efficient disease identification.
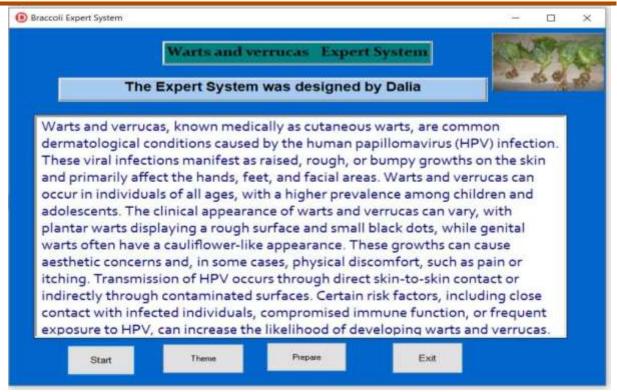
Figure 1: First destination

Then appear list about destination diagnosis to show the symptoms for the user to choose the symptoms that will be treatment

Figure 2: Symptom destination

3. LITERATURE REVIEW

Warts and verrucas, caused by the human papillomavirus (HPV) infection, have been extensively researched and documented in the medical literature. Epidemiological studies have shed light on their prevalence and distribution, revealing that these dermatological conditions affect individuals of all ages and populations. Risk factors such as close contact with infected individuals, immunocompromised status, and frequent exposure to HPV have been identified.

Clinical studies have focused on the characteristic appearance of warts and verrucas, aiding in their diagnosis and differentiation from other skin conditions. Various types of warts, including common warts, plantar warts, and genital warts, have been described, each with distinct clinical features. Understanding these presentations is essential for accurate diagnosis and appropriate management.

The pathogenesis of warts and verrucas has been extensively investigated. HPV, a DNA virus, infects epithelial cells and triggers the formation of these growths. Different HPV types associated with warts and verrucas, as well as their mechanisms of replication and immune evasion, have been explored. The interaction between HPV and the host immune response has also been studied to better understand disease progression and regression.

Diagnostic methods for warts and verrucas have been explored in the literature, with clinical examination remaining the primary approach. However, studies have examined adjunctive techniques such as dermoscopy, histopathology, and molecular testing to improve diagnostic accuracy. Specific features and biomarkers have been identified to aid in differentiation from other skin conditions.

Treatment modalities for warts and verrucas have been extensively studied, with topical therapies like salicylic acid and cryotherapy being commonly used. Other options, such as laser therapy, electrosurgery, immunotherapy, and surgical excision, have also been investigated. Comparative studies have assessed their effectiveness based on lesion size, location, and patient preferences.

Psychosocial impacts of warts and verrucas have been explored, emphasizing the emotional and social consequences on individuals' quality of life. Patient education, psychological support, and interventions have been recommended to mitigate the psychosocial burden.

Overall, the literature on warts and verrucas provides a comprehensive understanding of their epidemiology, clinical presentation, pathogenesis, diagnosis, and management. This knowledge contributes to improved patient care, enabling accurate diagnosis, appropriate treatment selection, and patient education. Further research is needed to explore emerging diagnostic techniques, optimize treatment strategies, and develop preventive measures against HPV infection.

4. KNOWLEDGE REPRESENTATION

There are fifthteen procedures to be diagnosed through symptoms that are displayed using CLIPS expert system language:
1. If a raised, rough, or bumpy skin lesion is observed in a patient, consider the possibility of a wart or verruca..
2. If the lesion is found on the hands, feet, or other areas susceptible to friction or pressure, consider the possibility of a wart or verruca.
3. If a lesion displays a rough surface with small black dots, it suggests the possibility of a plantar wart.
4. The possibility of a genital wart should be considered if the lesion presents a cauliflowerlike appearance.
5. The presence of pain or itching in the lesion indicates a possible wart or verruca.
6. Consider the possibility of a contagious infection if there is a history of close contact with someone who has warts.
7. Consider the possibility of more widespread or difficult-to-treat warts if there is a history of immune compromise, such as HIV, organ transplant, or chemotherapy.
8. Consider referring to a dermatologist or other specialist for further evaluation and treatment if there is uncertainty about the diagnosis.
9. A small, raised, rough, or bumpy growth on the skin, especially on the hands, feet, or face, may indicate a wart or verruca.
10. It is likely a wart if the growth has a rough or uneven surface with tiny black dots (clotted blood vessels) in the center.
11. A growth that is flat, smooth, and flesh-colored may indicate a verruca.
12. A growth that causes pain, particularly when pressed, or discomfort while walking or standing, may be indicative of a plantar wart.

13. If the growth has spread or multiplied over time, it is likely a viral infection such as a wart or verruca.

14. It may be a sign of a more serious condition if the growth is accompanied by itching, bleeding, or oozing, and should be evaluated by a healthcare professional.

15. If the growth does not respond to over-the-counter wart treatments or persists despite treatment, it may require more aggressive therapy or removal by a healthcare professional.

Figure 2: Plantar Warts (Verruca Pedis)

5. EXPERT SYSTEM SOURCE CODE

```
(defrule disease1
(patient presents )
(raised)
(rough)
(bumpy skin lesion)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "1"  crlf )
)
```
IF the lesion is located on the hands, feet, or other areas prone to friction or pressure

```
(defrule disease2
(lesion is located on the hands)
(feet)
(other areas prone to friction)
(pressure )
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "2"  crlf ) )
```

```
(defrule disease3
(lesion appears to have a rough surface)
(small black dots)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "3"  crlf )  )
```

```
(defrule disease4
```

(lesion appears to have a cauliflower-like appearance)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "4" crlf))

(defrule disease5
(lesion is painful)
(itchy)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "5" crlf))

(defrule disease6
(history of close contact)
(someone who has warts)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "6" crlf)
)

(defrule disease7
(history of immune compromise)
(HIV)
(organ transplant)
(chemotherapy)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "7" crlf))

(defrule disease8 81. (uncertainty about the diagnosis)

(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "8" crlf))

(defrule disease9
(small)
(raised)
(rough)
(bumpy growth appears on the skin)
(particularly on the hands)
(feet)
(face)
(not (disease identified))
=>

```
(assert (disease identified))
(printout fdatao "9"  crlf )
)


(defrule disease10
(growth has a rough)
(uneven surface)
(tiny black dots)
(clotted blood vessels in the center)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "10"  crlf )
)


(defrule disease11
(growth is flat)
(smooth)
(flesh-colored)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "11"  crlf )
)


(defrule disease12
(growth is painful)
(especially when pressed)
(causes discomfort while walking)
(causes discomfort while standing)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "12"  crlf )
)


(defrule disease13
(growth has spread)
(multiplied over time)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "13"  crlf )
)


(defrule disease14
(growth is accompanied by itching)
(bleeding)
(oozing)
(not (disease identified))
=>
(assert (disease identified))
```

```
(printout fdatao "14"  crlf )
)


 (defrule disease15
(growth does not respond to over-the-counter wart treatments)
(persists despite treatment)
(not (disease identified))
=>
(assert (disease identified))
(printout fdatao "15"  crlf )
)


(defrule endline
(disease identified)
=>
(close fdatao)
)


(defrule readdata
(declare (salience 1000))
(initial-fact)
?fx <- (initial-fact)
=>
(retract ?fx)
(open "data.txt" fdata "r") 190.        (open "result.txt" fdatao "w")


(bind ?symptom1 (readline fdata))
(bind ?symptom2 (readline fdata))
(bind ?symptom3 (readline fdata))
(bind ?symptom4 (readline fdata))
(bind ?symptom5 (readline fdata))
(bind ?symptom6 (readline fdata))
(bind ?symptom7 (readline fdata))
(bind ?symptom8 (readline fdata))
(bind ?symptom9 (readline fdata))
(bind ?symptom10 (readline fdata))
(bind ?symptom11 (readline fdata))
(bind ?symptom12 (readline fdata))
(bind ?symptom13 (readline fdata))
(bind ?symptom14 (readline fdata))
(assert-string (str-cat "(" ?symptom1 ")"))
(assert-string (str-cat "(" ?symptom2 ")"))
(assert-string (str-cat "(" ?symptom3 ")"))
(assert-string (str-cat "(" ?symptom4 ")"))
(assert-string (str-cat "(" ?symptom5 ")"))
(assert-string (str-cat "(" ?symptom6 ")"))
(assert-string (str-cat "(" ?symptom7 ")"))
(assert-string (str-cat "(" ?symptom8 ")"))
(assert-string (str-cat "(" ?symptom9 ")"))
(assert-string (str-cat "(" ?symptom10 ")"))
(assert-string (str-cat "(" ?symptom11 ")"))
(assert-string (str-cat "(" ?symptom12 ")"))
```

```
(assert-string (str-cat "(" ?symptom13 ")"))
(assert-string (str-cat "(" ?symptom14 ")"))
(close fdata)
)
```

CONCLUSION:

An expert system has been developed for the diagnosis of warts and verrucas. The system provides different procedures based on the symptoms observed, including: examining the lesion for characteristic features, conducting specific tests for the presence of warts or verrucas, considering alternative causes for the symptoms, and performing confirmatory testing or exploring alternative treatments. This expert system aids in the accurate and appropriate diagnosis of warts and verrucas, assisting healthcare professionals in determining the suitable treatment for these conditions.

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